

Inventor: Criscione, et al.
Title: Gripper Devices

1 **CLAIMS**

2 Having thus described the invention what is claimed as new and desired to be secured by
3 Letters Patent is as follows:

4 1. An apparatus for transferring objects from a first location to a second location
5 comprising:
6 a frame;
7 first means mounted on the frame for holding a plurality of objects;
8 second means for moving objects away from the first means;
9 third means for picking up objects from the first means and depositing the objects at the
10 second means, said third means including a movable member, and a support
11 mounted on the frame;
12 means supporting the member on the frame for movement relative to the first and second
13 means;
14 drive means for moving the member;
15 an object pickup device mounted on the member, said object pickup device being
16 operable to pickup an object in the first means, transport the object to a location
17 above the second means and release the object thereby allowing the object to be
18 placed at the second means;
19 said object pickup device further comprising a gripper protruding from said object pickup
20 device for engagement with objects.

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- 1 2. An apparatus for transferring objects from a first location to a second location
2 comprising:
3 first means for holding a plurality of objects;
4 second means for holding objects;
5 third means for picking up objects from the first means and depositing the objects at the
6 second means,
7 an object pickup device mounted on the third means, said object pickup device being
8 operable to pickup an object in the first means, transport the object to a location
9 above the second means and release the object thereby allowing the object to be
10 placed at the second means;
11 said object pickup device further comprising a gripper protruding from said object pickup
12 device for engagement with objects.
- 13 3. The apparatus as claimed in Claim 2 wherein said gripper comprises a piercing
14 probe.
- 15 4. The apparatus as claimed in Claim 3 wherein said piercing probe comprises an
16 expandable needle.
- 17 5. The apparatus as claimed in Claim 3 wherein said piercing probe comprises a
18 barbed endpoint.
- 19 6. The apparatus as claimed in Claim 2 wherein said gripper comprises a tweezers.
- 20 7. The apparatus as claimed in Claim 3 wherein said piercing probe comprises a
21 screw.

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1 8. The apparatus as claimed in Claim 2 wherein said gripper comprises a gear and
2 finger.

3 9. The apparatus as claimed in Claim 2 wherein said gripper comprises a temperature
4 controllable surface.

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1 10. An apparatus for transferring objects from a first location to a second location
2 comprising:
3 a frame;
4 first means mounted on the frame for holding a plurality of objects;
5 second means for moving objects away from the first means;
6 third means for picking up objects from the first means and depositing the objects at the
7 second means, said third means including a movable member, and a support
8 mounted on the frame;
9 means supporting the member on the frame for movement relative to the first and second
10 means;
11 drive means for moving the member;
12 an object pickup device mounted on the member, said object pickup device being
13 operable to pickup an object in the first means, transport the object to a location
14 above the second means and release the object thereby allowing the object to be
15 placed at the second means;
16 said object pickup device further comprising a temperature controllable gripper for
17 engagement with objects.

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1 11. An apparatus for transferring objects from a first location to a second location
2 comprising:
3 first means for holding a plurality of objects;
4 second means for holding objects;
5 third means for picking up objects from the first means and depositing the objects at the
6 second means;
7 an object pickup device mounted on the third means, said object pickup device being
8 operable to pickup an object in the first means, transport the object to a location
9 above the second means and release the object thereby allowing the object to be
10 placed at the second means;
11 said object pickup device further comprising a temperature controllable gripper for
12 engagement with objects.

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- 1 12. A method of transferring objects from a first location to a second location
2 comprising:
3 locating an object pick-up means above the first location containing at least one object,
4 moving the object pick-up means toward and in close proximity to the object in the first
5 location and engaging a protruding gripper of said pick-up means with the object
6 to retain the object on said pick-up means,
7 transporting the pick-up means and object retained thereon during engagement from said
8 first location to a position above the second location,
9 releasing the object from the pick-up means by disengaging said gripper from the object
10 whereby the object moves away from the pick-up means to the second location.
- 11 13. The method as claimed in Claim 12 wherein said step of engaging a gripper of
12 said pick-up means with the object further comprises the step of piercing the object with said
13 grripper.
- 14 14. The method as claimed in Claim 13 wherein said step of engaging a gripper of
15 said pick-up means with the object further comprises the steps of expanding a portion of said
16 grripper to prevent premature disengagement of the object from said gripper.
- 17 15. The method as claimed in Claim 14 wherein said step of disengaging said gripper
18 from the object further comprises the step of collapsing said expanded portion of said gripper.
- 19 16. The method as claimed in Claim 13 wherein said gripper includes a barbed
20 endpoint.
- 21 17. The method as claimed in Claim 13 wherein said piercing step further comprises
22 the step of extending said gripper from said pick-up means.

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1 18. The method as claimed in Claim 13 wherein said releasing step further comprises
2 the step of retracting said gripper.

3 19. The method as claimed in Claim 18 wherein an endpoint of said gripper is
4 retracted into a cavity of said pick-up means, causing the object to disengage from the gripper as
5 said gripper is retracted and the object is biased against an outer surface of the pick-up means.

6 20. The method as claimed in Claim 13 wherein said piercing step further comprises
7 the step of screwing said gripper into the object.

8 21. The method as claimed in Claim 12 wherein said step of engaging a gripper of
9 said pick-up means with the object further comprises the step of clamping the object with said
10 gripper.

11 22. The method as claimed in Claim 21 wherein said step of clamping the object is
12 performed by a tweezers.

13 23. The method as claimed in Claim 21 wherein said step of clamping the object is
14 performed by a gear and finger.

15 24. The method as claimed in Claim 12 wherein said step of engaging a gripper of
16 said pick-up means with the object further comprises the steps of:

17 adjusting a temperature controllable surface of said gripper to a cold temperature; and
18 contacting the object with said temperature controllable surface.

19 25. The method as claimed in Claim 24 wherein said step of disengaging said gripper
20 from the object further comprises the step of adjusting said temperature controllable surface of
21 said gripper to a warm temperature.

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1 26. A method of transferring objects from a first location to a second location
2 comprising:
3 locating an object pick-up means above the first location containing at least one object,
4 moving the object pick-up means toward and in close proximity to the object in the first
5 location and contacting the object with a temperature controllable surface of said
6 pick-up means that has been adjusted to a cold temperature to retain the object on
7 said pick-up means,
8 transporting the pick-up means and object retained thereon from said first location to a
9 position above the second location,
10 releasing the object from the pick-up means by adjusting said temperature controllable
11 surface to a warm temperature whereby the object moves away from the pick-up
12 means to the second location.

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- 1 27. An object pickup device for use in an apparatus for transferring objects from a
- 2 first location to a second location, the apparatus including an array of said object pickup devices,
- 3 said object pickup device comprising:
- 4 a gripper protruding from said object pickup device for engagement with objects.

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- 1 28. An object pickup device for use in an apparatus for transferring objects from a
2 first location to a second location, the apparatus including an array of said object pickup devices,
3 said object pickup device comprising:
4 a temperature controllable gripper for engagement with objects.